

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT I, NOBUHIRO ITOH, a citizen of Japan residing at Saitama, Japan have invented certain new and useful improvements in

FACSIMILE DEVICE READING LINES OF IMAGE DATA  
DIVISIVELY IN A SUB-SCANNING DIRECTION

of which the following is a specification:-

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BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a facsimile device and a controlling method thereof, and more particularly, to a facsimile device reading and transmitting a large-size subject copy, and a controlling method thereof.

2. Description of the Related Art

Conventionally, when a facsimile device reads and transmits a large-size subject copy, the conventional facsimile device divides image data of the subject copy in a main-scanning direction, and transmits the divided image data of the subject copy.

However, according to the above-mentioned conventional method, when a size of the subject copy is longer in a sub-scanning direction than a recording paper having a standard size, the subject copy needs to undergo a further dividing process in a device receiving the transmitted image data of the subject copy, depending on a size of a recording paper set in the receiving device.

SUMMARY OF THE INVENTION

It is a general object of the present invention to provide an improved and useful facsimile

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device in which the above-mentioned problems are eliminated.

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A more specific object of the present invention is to provide a facsimile device which divides

5 a subject copy in a sub-scanning direction into image data not larger than a standard size so as not to necessitate a dividing process or a reducing process in a device receiving the image data of the subject copy, which prevents even slight image data from being omitted

10 due to an error in a dividing process, when divisively reading image data in the vicinity of a central part of a subject copy where image information such as characters may likely converge, which can transmit a form, such as a cover form not requiring a dividing

15 process, as a first page along with a large-size subject copy, and which compensates for an error in operation by reducing a subject copy set as a first page to an A3-size width transmittable according to a communications protocol, when the subject copy set as the first page is

20 larger than the A3-size width, and a divisional reading is not specified to the first page, such as a cover form.

In order to achieve the above-mentioned objects, there is provided according to the present invention a facsimile device, and a controlling method

25 thereof, the facsimile device comprising:

inputting means for inputting image data of a subject copy having a width in a main scanning direction larger than an A3-size width;

5       reading means for divisively reading lines of the image data in a sub-scanning direction by dividing the image data into divisional lines of data having a predetermined width;

10       image rotating means for performing an image rotation with respect to each of the divisional lines of data so as to supply rotated divisional lines;

encoding means for encoding each of the rotated divisional lines into encoded data; and

outputting means for outputting the encoded data.

15       According to the present invention, the facsimile device can smoothly send the image of a subject copy, such as a drawing, which is larger than an A3-size width transmittable according to a communications protocol, and should be transmitted with  
20       an unchanged scale so as to keep fine parts clearly visible.

          Additionally, in the facsimile device according to the present invention, the reading means may divisively read the lines of the image data in the  
25       sub-scanning direction by scanning a plurality of areas

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of the image data sharing an overlapping width predetermined in the sub-scanning direction.

According to the present invention, it is possible to reproduce image data faithfully in the vicinity of a central part of a subject copy where image information such as characters may likely converge, due to the overlapping width surely maintaining the image data in the vicinity of the divided part around the central part of the subject copy.

10           Additionally, in the facsimile device according to the present invention, the reading means may divisively read the lines of the image data in the sub-scanning direction by dividing the image data of the subject copy at a predetermined page into the divisional  
15   lines of data.

According to the present invention, the size of a subject copy at a first page, such as a cover form, does not have to be made equal to the size of a large-size subject copy that follows the first page. This  
20   shortens a transmission time.

Additionally, in the facsimile device according to the present invention, the reading means may reductively read image data of a subject copy having a width larger than the A3-size width by reducing the  
25   image data as a whole to the A3-size width, when the

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subject copy is not at a page to be divisively read.

According to the present invention, when a subject copy attached at a first page as a cover form, etc., is larger in size than the A3-size width

5 transmittable according to a communications protocol, the subject copy is subjected to a reducing process. This not only shortens a transmission time, but also ensures the transmission of the image data of the subject copy to a receiving device without causing any  
10 problem despite the erroneous selection of the size of the form at the first page.

Other objects, features and advantages of the present invention will become more apparent from the following detailed description when read in conjunction  
15 with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a block diagram of a structure of a facsimile device according to an embodiment of the  
20 present invention;

FIG.2 illustrates a specific example of divisively reading a large-size subject copy;

FIG.3 is an illustration of a display example of an operation display unit used to select a first page  
25 of a large-size subject copy upon divisively reading the

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large-size subject copy; and

FIG.4 is a flowchart of an example of processes performed in the facsimile device according to the embodiment of the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A description will now be given, with reference to the drawings, of embodiments of a facsimile device and a controlling method thereof according to the present invention. FIG.1 to FIG.4 illustrates the  
10   embodiments of the facsimile device and the controlling method thereof according to the present invention.

FIG.1 is a block diagram of a structure of the facsimile device according to the embodiment of the  
15   present invention. In FIG.1, the facsimile device according to the present embodiment comprises a system control unit 1, an operation display unit 2, a division/reduction control unit 3 (reading means), a communication control unit 4, a modem 5, a network  
20   control device 6, a scanner 7 (inputting means), a plotter 8 (outputting means), an encoding/decoding unit 9 (encoding means), an image storage unit 10, and an image rotating unit 11 (image rotating means).

The system control unit 1 manages and controls  
25   operations of the above-mentioned facsimile device as a

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whole, and supplies operation commands to each of the above-mentioned components via a system bus.

The operation display unit 2 comprises various operation keys provided for an operator to operate the  
5 facsimile device arbitrarily, and various display devices provided for displaying matters, such as messages from the facsimile device to the operator.

The division/reduction control unit 3 judges whether or not a size in a main scanning direction of  
10 image information read by the scanner 7 is larger than an A3-size width which is a maximum width supposed to be communicable according to a communications protocol. When the size is larger than the A3-size width, the  
15 division/reduction control unit 3 judges whether or not the read page is to be divided, and reads the page by dividing, or by reducing the page as a whole to the A3-size width.

The communication control unit 4 performs a facsimile transmission according to a predetermined  
20 transmission control procedure. The modem 5 modulates a transmission signal and demodulates a received signal. The communication control unit 4 is connected via the modem 5 and the network control device 6 to a transmission network (e.g., a public telephone line).

25 The scanner 7 resolves a transmission image

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into pixels at a predetermined resolution, and converts each of the pixels to a monochrome image signal.

The plotter 8 outputs an image by recording the image on paper at the same resolution as the scanner

5 7.

The encoding/decoding unit 9 encodes image information to be transmitted according to a predetermined method so as to compress the amount thereof, and decodes received encoded image information  
10 into original image information thereof.

The image storage unit 10 temporarily stores image information read by the scanner 7 for the purpose of applying image editions to the read image, such as an image rotation and an image reduction.

15 The image rotating unit 11 interchanges image data in a main-scanning direction and image data in a sub-scanning direction included in the image information stored in the image storage unit 10, and restores the rotated image information (including the interchanged  
20 image data) in the image storage unit 10. In this course, the rotation angle of the image information is 90 degrees or 270 degrees.

According to the above-described structure, the facsimile device of the present invention can  
25 transmit a large-size subject copy all at one

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transmission operation, and also can transmit a subject copy by dividing the subject copy fewer times.

Therefore, the facsimile device of the present invention can reproduce an original image more faithfully, and can  
5 transmit the reproduced image as an image with the same magnification as the original image.

FIG.2 illustrates a specific example of processes performed in the facsimile device according to the embodiment of the present invention so as to read a  
10 large-size subject copy by dividing/reducing the large-size subject copy. As shown in FIG.2, when a large-size subject copy is read by dividing the image thereof into two read areas sharing an overlapping width determined voluntarily by an operator, positions which the first  
15 read area and the second read area are read from are varied according to the overlapping width. This overlapping width minimizes a possibility that image data in the vicinity of a division line be omitted by failing to be read accurately.

FIG.3 illustrates a specific example of a  
20 method of selecting a first page upon reading a large-size subject copy by dividing the large-size subject copy in the facsimile device according to the embodiment of the present invention. When a document is sent via a  
25 facsimile device, a cover form is customarily

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accompanied with the document. Accordingly, upon sending such a cover form along with a large-size subject copy by the facsimile device according to the present embodiment, an operator can specify differences

5 in controlling the divisional reading of the large-size subject copy, with respect to the reading of the cover form, in an initial transmission setting via a use-friendly transmission operation screen as shown in FIG.3.

FIG.4 is a flowchart of an example of

10 processes performed in the facsimile device according to the embodiment of the present invention so as to read a large-size subject copy by dividing/reducing the large-size subject copy. First, an operator specifies which

15 of a page dividing process and a page reducing process is to be performed to a subject copy to be transmitted (step S1).

When the page dividing process is specified in the step S1 (step S2/Yes), the first read area and the second read area of the subject copy are read with an

20 image in the overlapping width voluntarily determined in the central part in the sub-scanning direction being read twice (step S3).

When the page dividing process is not specified in the step S1 (step S2/No), it is judged

25 whether or not a size of the subject copy in the main

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scanning direction is larger than the A3-size width  
(step S4). When the size in the main scanning direction  
is larger than the A3-size width (step S4/Yes), the  
subject copy is read by being reduced to the A3-size  
5 width (step S5).

When the size in the main scanning direction  
is not larger than the A3-size width (step S4/No), the  
subject copy is read with an unchanged scale (step S6).

The present invention is not limited to the  
10 specifically disclosed embodiments, and variations and  
modifications may be made without departing from the  
scope of the present invention.

The present application is based on Japanese  
priority application No. 2001-014980 filed on January 23,  
15 2001, the entire contents of which are hereby  
incorporated by reference.

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